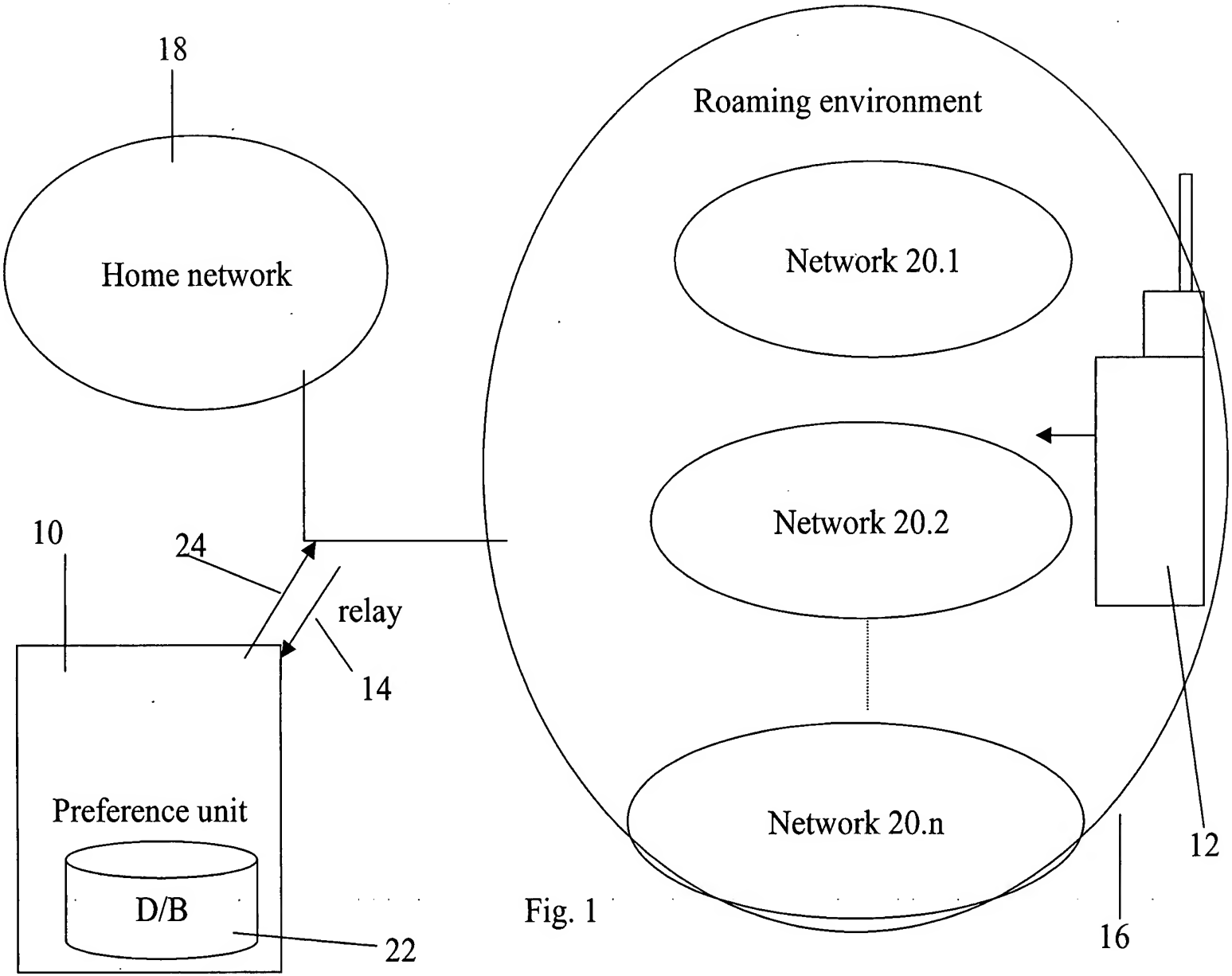

18
Home network
Roaming environment
Network 20.1
Network 20.2
Network 20.n
10
24
relay
14
Preference unit
D/B
22
12
16

Fig. 1

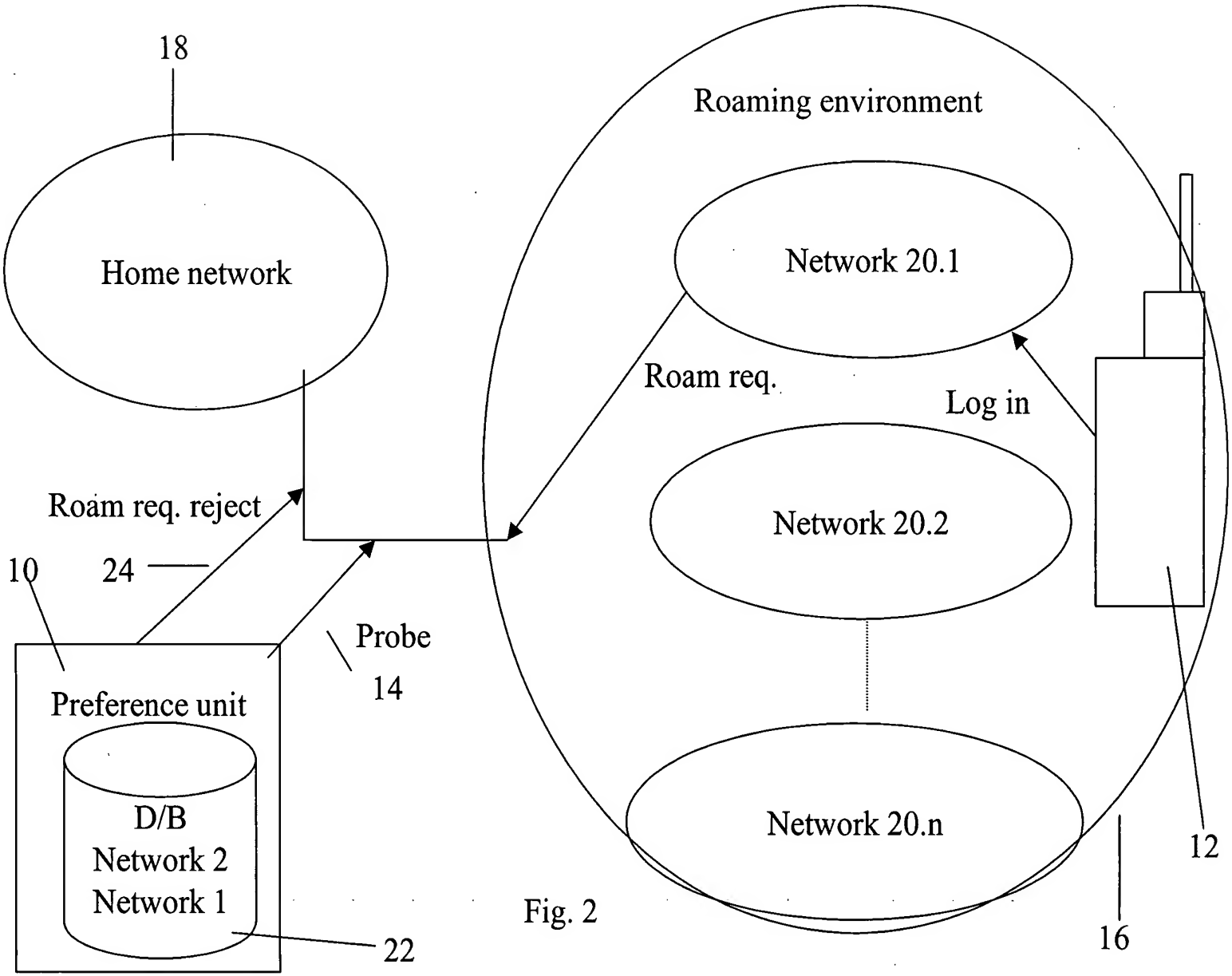

18
Home network
Roaming environment
Network 20.1
Roam req.
Log in
Network 20.2
Roam req. reject
24
10
Probe
14
Preference unit
D/B
Network 2
Network 1
22
Network 20.n
12
16

Fig. 2

Fig. 3

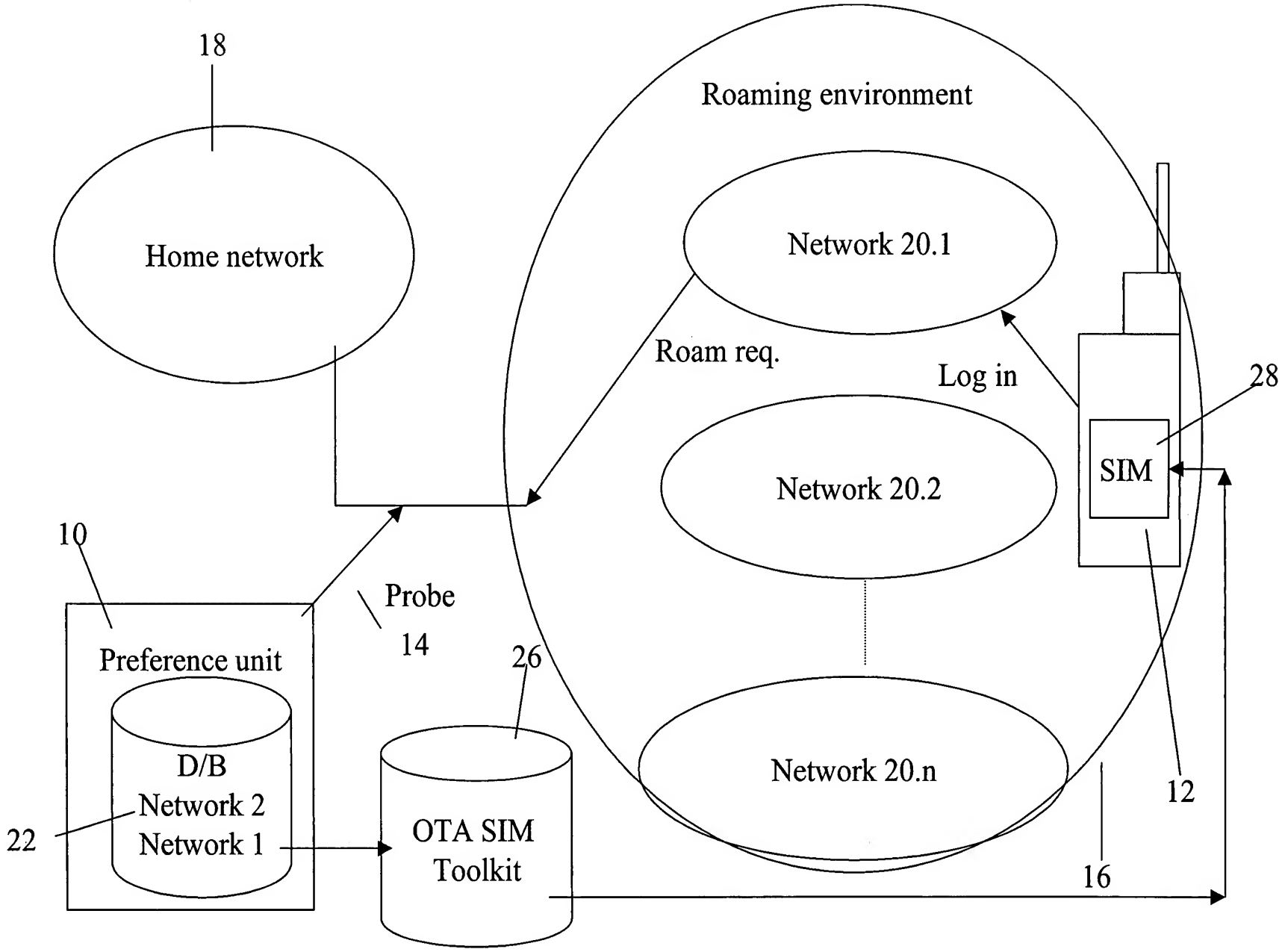
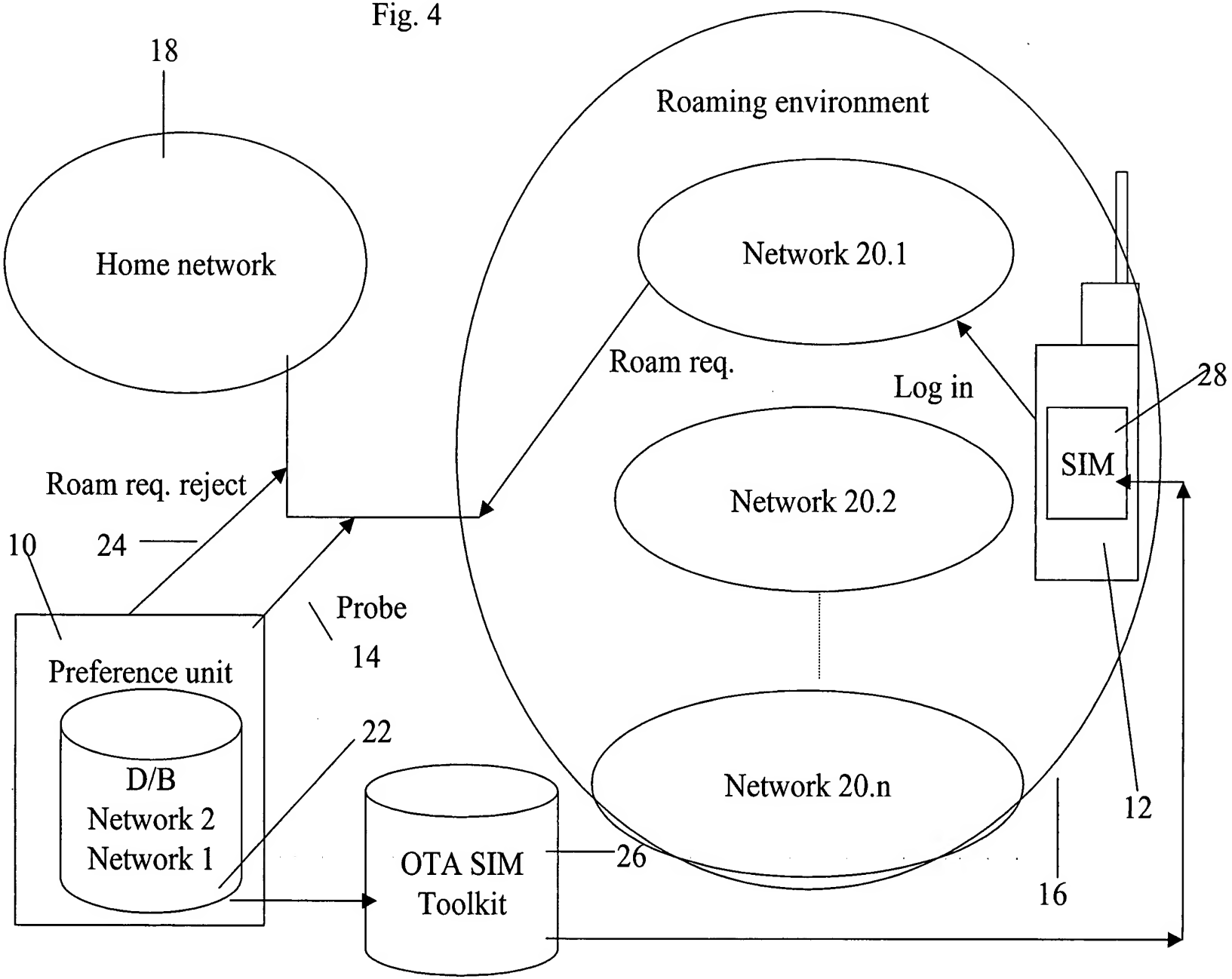

18
Home network
Roaming environment
Network 20.1
Roam req.
Log in
28
SIM
Network 20.2
10
Probe
14
Preference unit
26
D/B
Network 2
Network 1
22
OTA SIM
Toolkit
Network 20.n
12
16

Fig. 4


18
Home network
Roaming environment
Network 20.1
Roam req.
Log in
28
SIM
Network 20.2
Roam req. reject
10
24
Probe
14
Preference unit
D/B
Network 2
Network 1
22
OTA SIM
Toolkit
26
Network 20.n
12
16

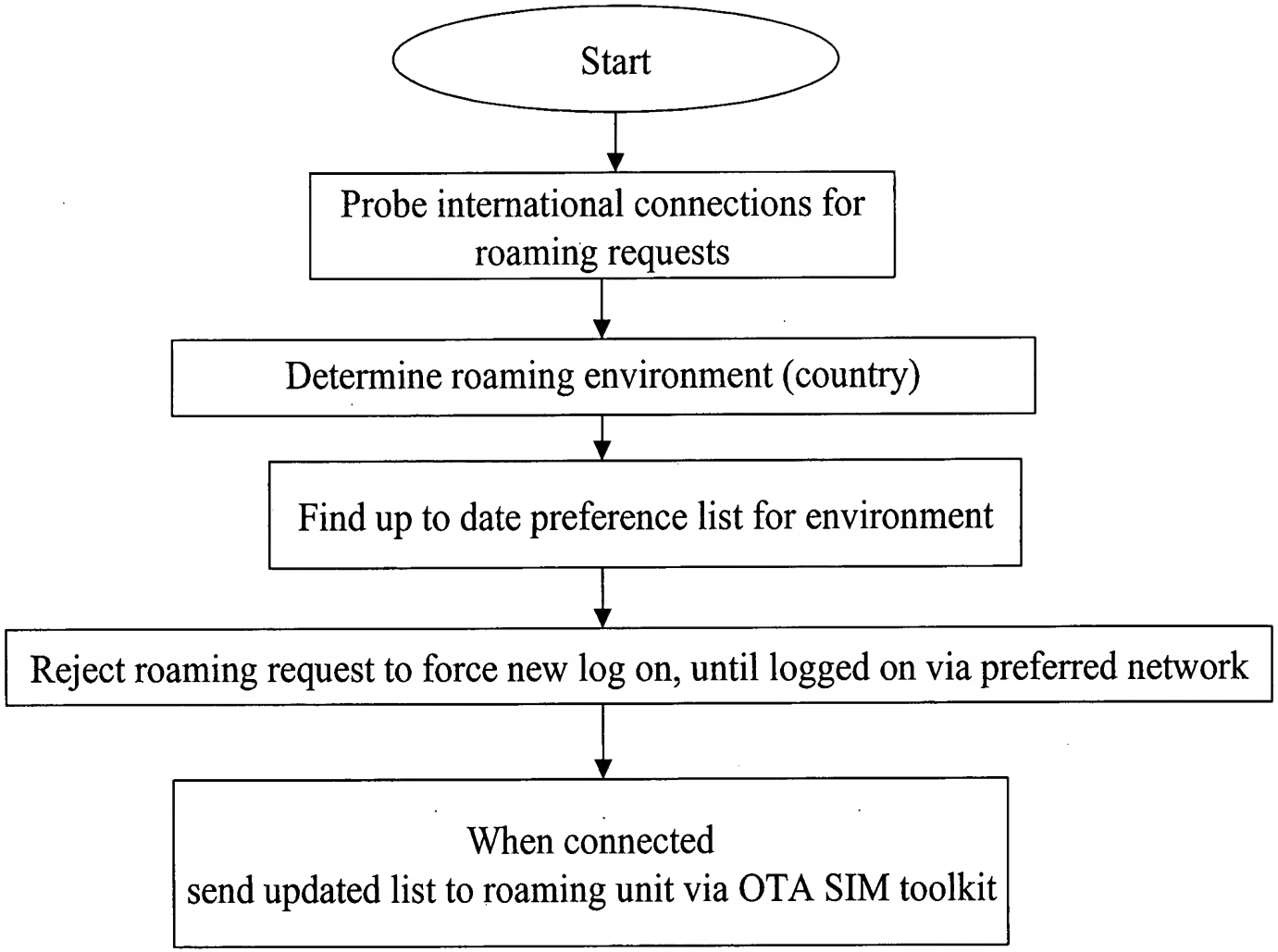

Start
Probe international connections for roaming requests
Determine roaming environment (country)
Find up to date preference list for environment
Reject roaming request to force new log on, until logged on via preferred network
When connected
send updated list to roaming unit via OTA SIM toolkit

Fig. 5

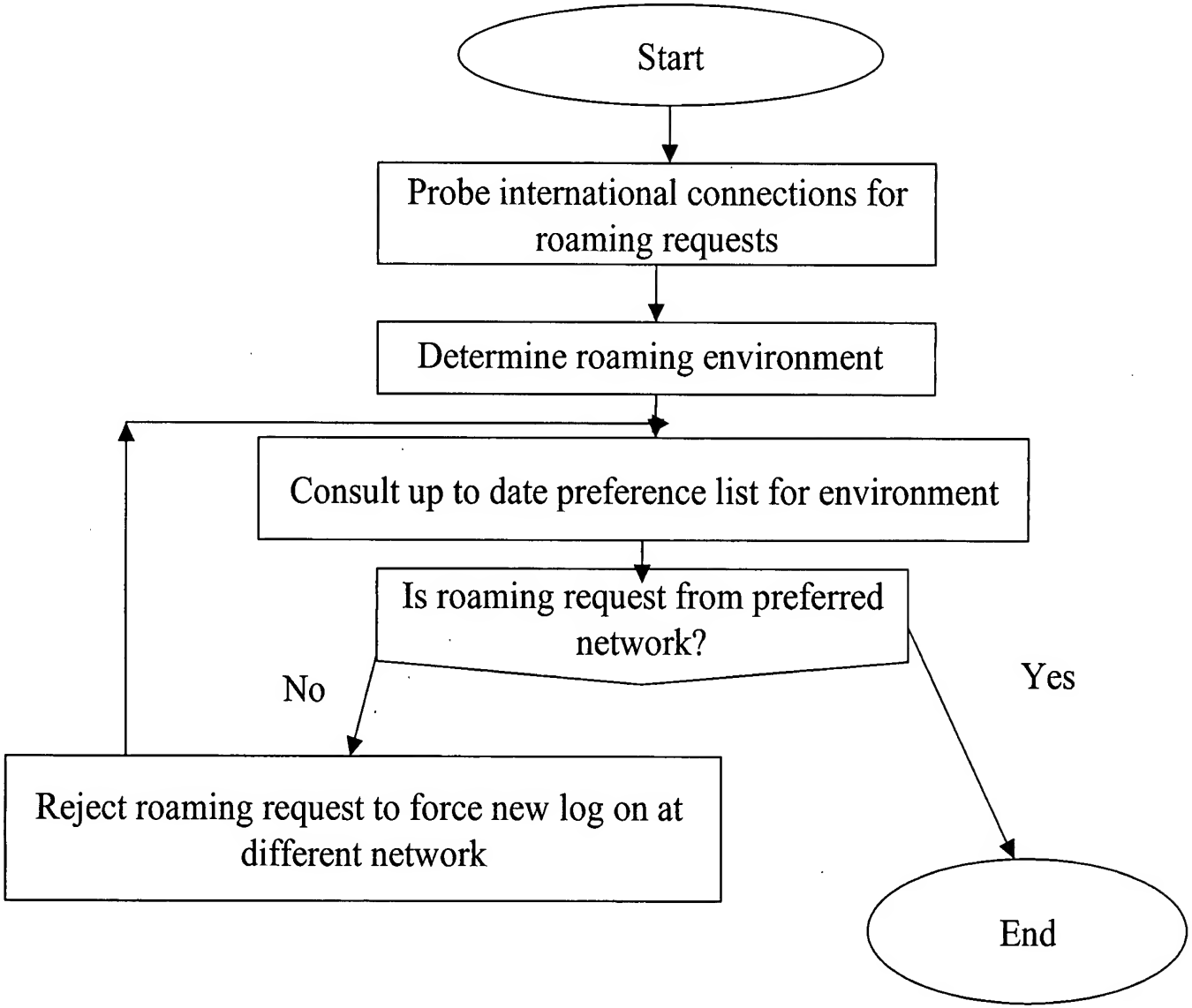

Start
Probe international connections for roaming requests
Determine roaming environment
Consult up to date preference list for environment
Is roaming request from preferred network?
No
Yes
Reject roaming request to force new log on at different network
End

Fig. 6

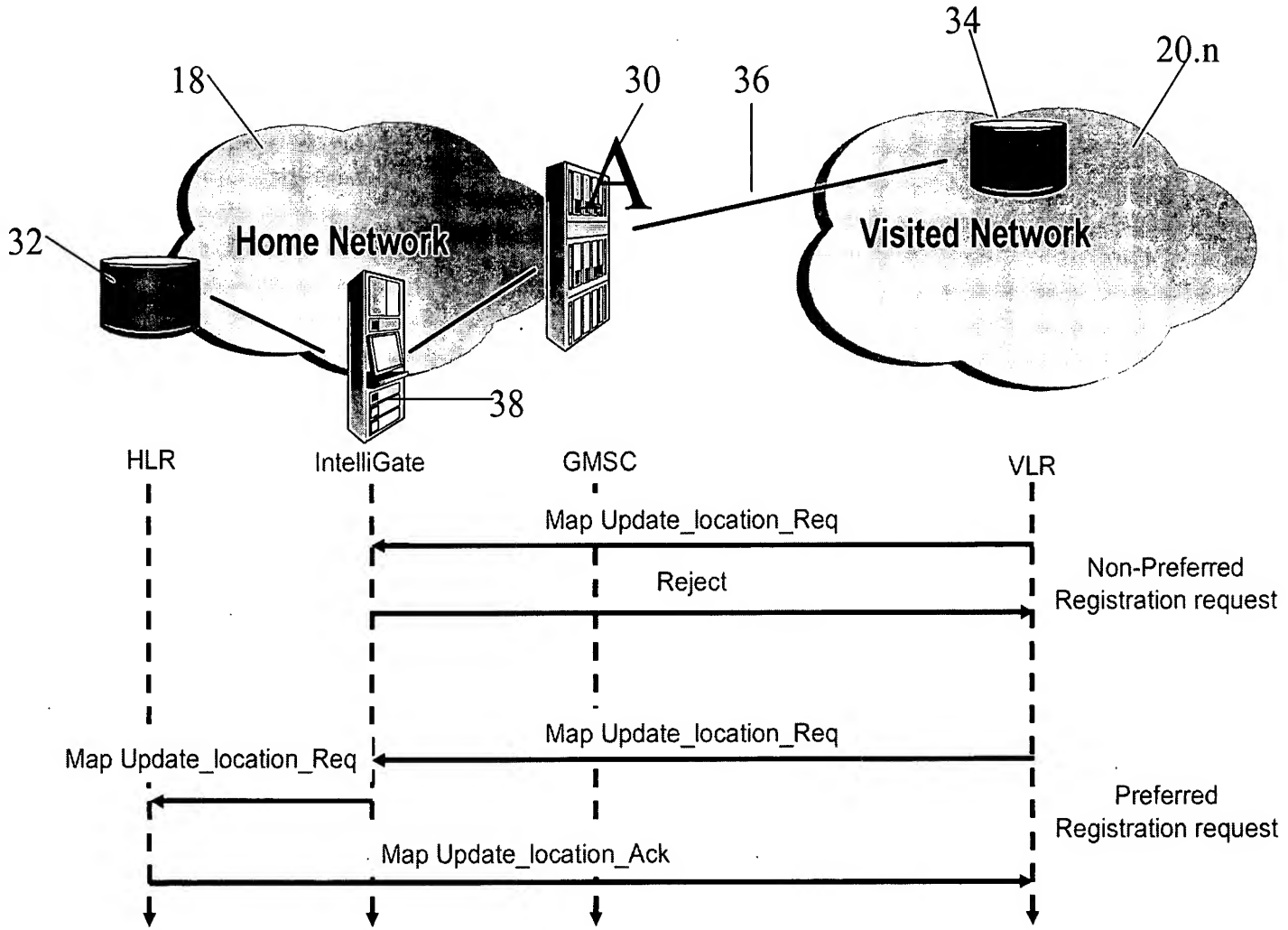

18
30
36
34
20.n
32
Home Network
Visited Network
38
HLR
IntelliGate
GMSC
VLR
Map Update_location_Req
Reject
Non-Preferred
Registration request
Map Update_location_Req
Map Update_location_Req
Preferred
Registration request
Map Update_location_Ack

Fig. 7

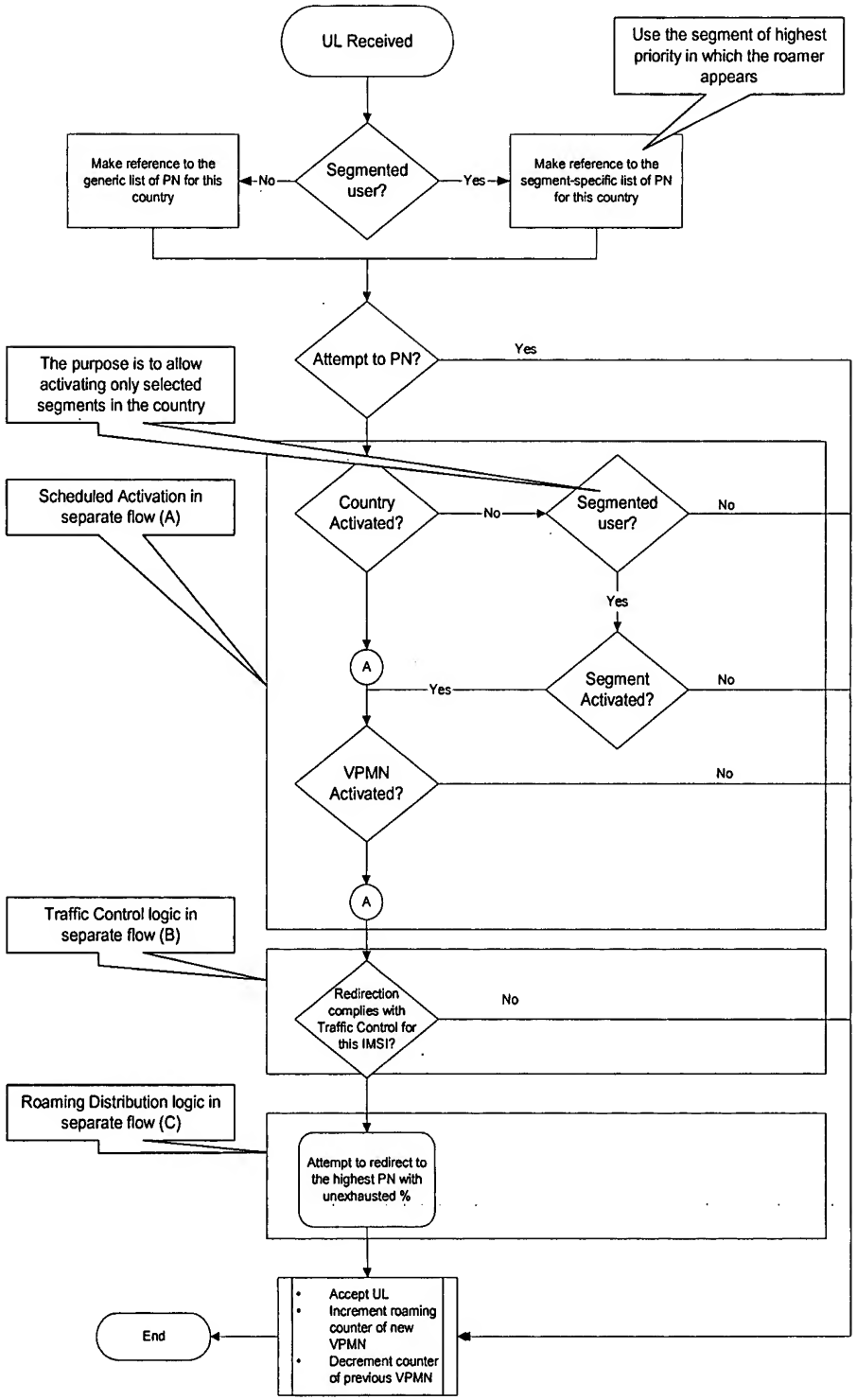

UL Received
Use the segment of highest priority in which the roamer appears
Make reference to the generic list of PN for this country
No
Segmented user?
Yes
Make reference to the segment-specific list of PN for this country
Attempt to PN?
Yes
The purpose is to allow activating only selected segments in the country
Scheduled Activation in separate flow (A)
Country Activated?
No
Segmented user?
No
Yes
A
Yes
Segment Activated?
No
VPMN Activated?
No
A
Traffic Control logic in separate flow (B)
Redirection complies with Traffic Control for this IMSI?
No
Roaming Distribution logic in separate flow (C)
Attempt to redirect to the highest PN with unexhausted %
Accept UL
Increment roaming counter of new VPMN
Decrement counter of previous VPMN
End

Fig. 8

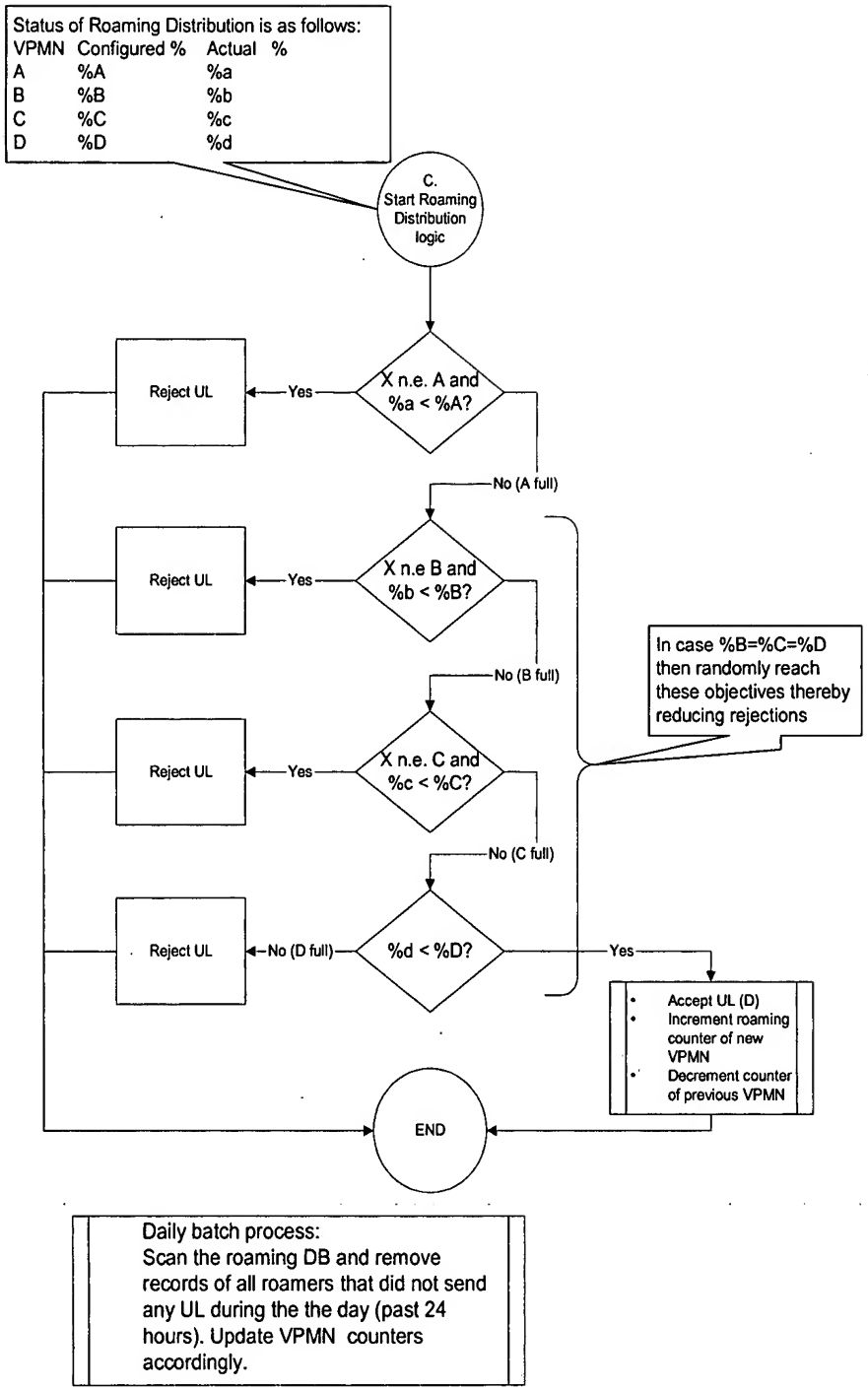

Status of Roaming Distribution is as follows:
VPMN Configured % Actual %
A %A %a
B %B %b
C %C %c
D %D %d
C.
Start Roaming Distribution logic
X n.e. A and %a < %A?
Yes
Reject UL
No (A full)
X n.e B and %b < %B?
Yes
Reject UL
No (B full)
X n.e. C and %c < %C?
Yes
Reject UL
No (C full)
%d < %D?
No (D full)
Reject UL
Yes
In case %B=%C=%D then randomly reach these objectives thereby reducing rejections
Accept UL (D)
Increment roaming counter of new VPMN
Decrement counter of previous VPMN
END
Daily batch process:
Scan the roaming DB and remove records of all roamers that did not send any UL during the the day (past 24 hours). Update VPMN counters accordingly.

Fig. 9

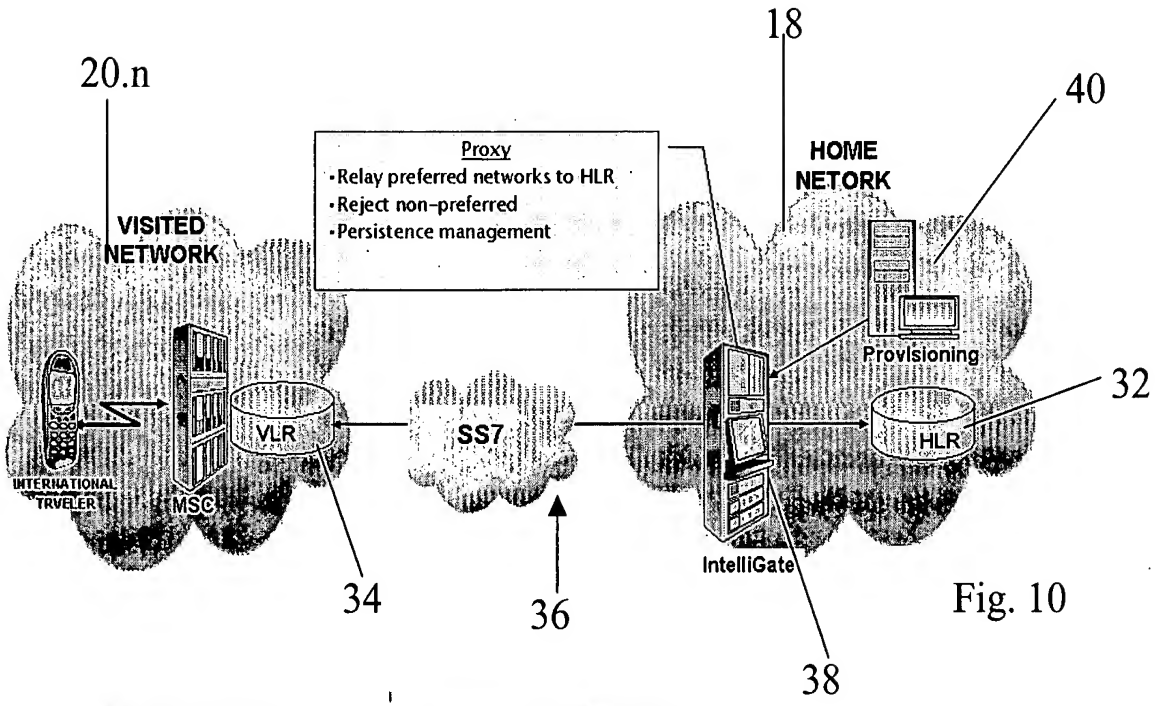

18
20.n
40
Proxy
•Relay preferred networks to HLR
•Reject non-preferred
•Persistence management
VISITED NETWORK
HOME NETORK
Provisioning
32
VLR
SS7
HLR
INTERNATIONAL TRVELER
MSC
IntelliGate
34
36
38

Fig. 10

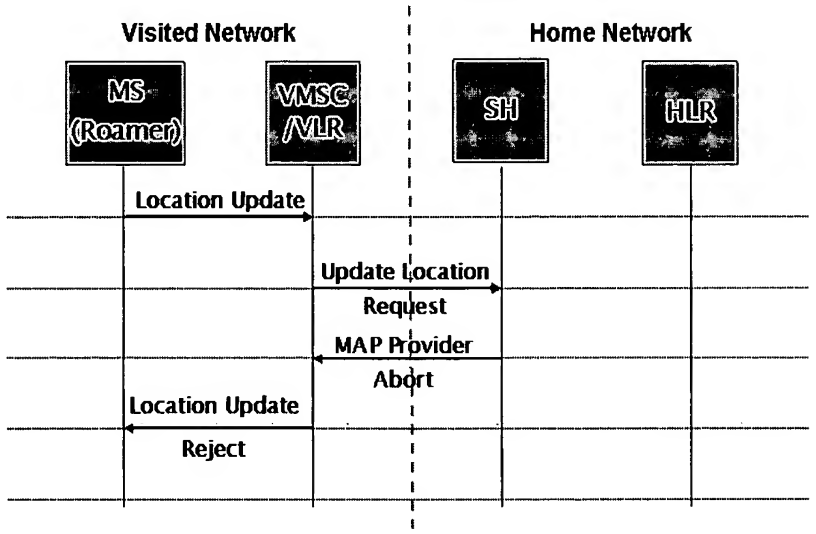

Visited Network
Home Network
MS (Roamer)
VMSC /VLR
SH
HLR
Location Update
Update Location
Request
MAP Provider
Abort
Location Update
Reject

Fig. 11

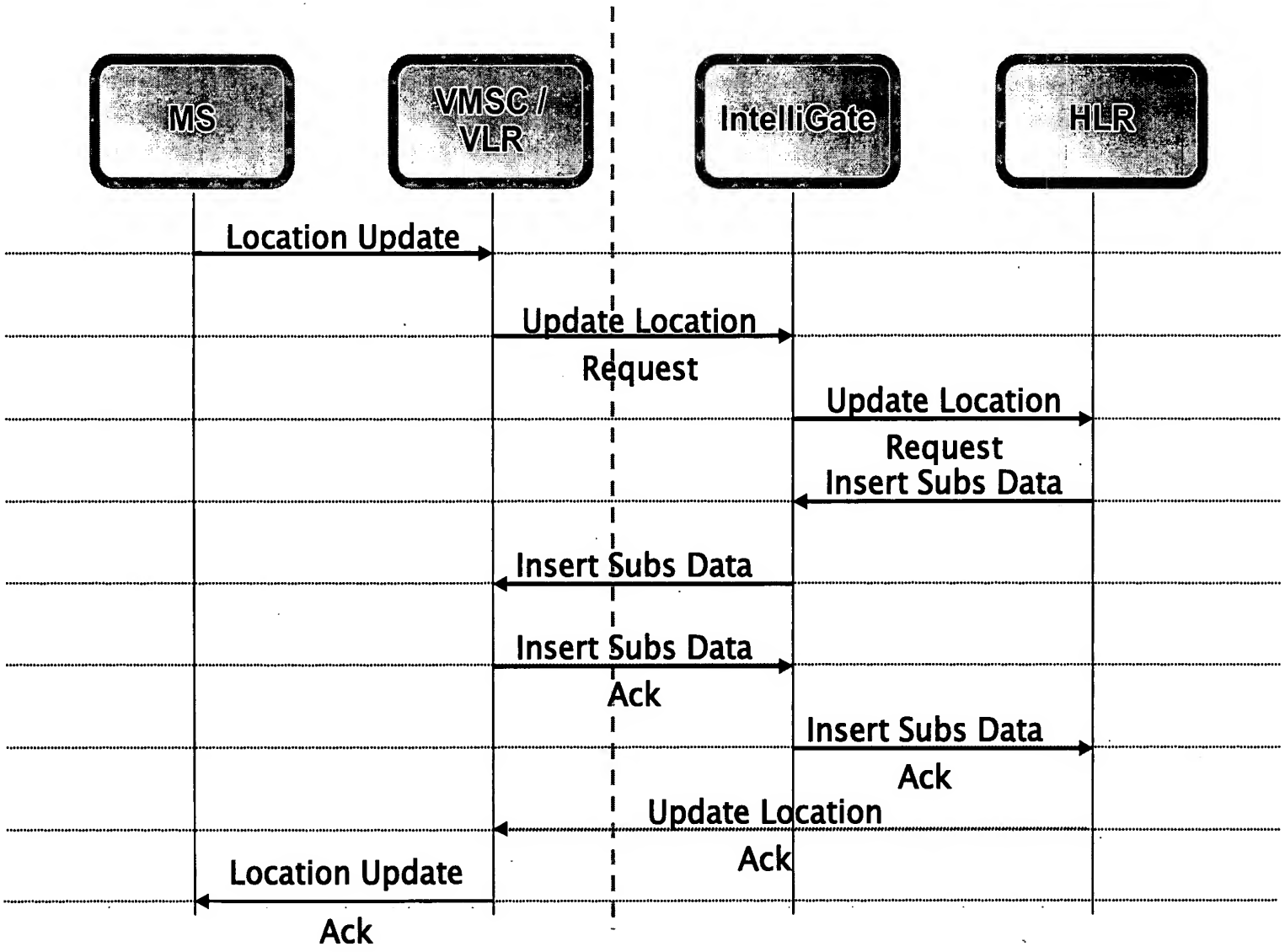

MS
VMSC / VLR
IntelliGate
HLR
Location Update
Update Location Request
Update Location Request
Insert Subs Data
Insert Subs Data
Insert Subs Data Ack
Insert Subs Data Ack
Update Location Ack
Location Update Ack

Fig 12

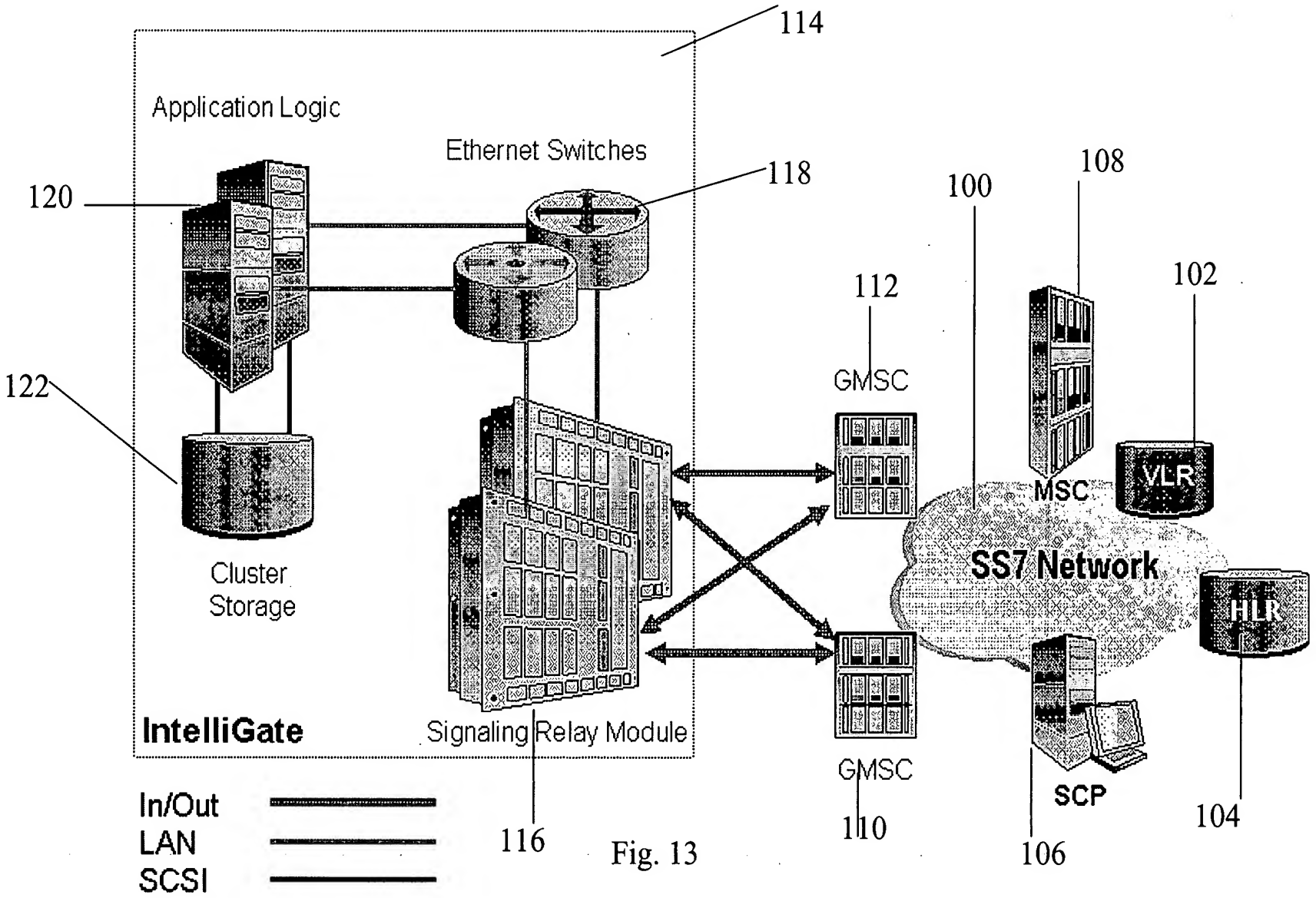

114
Application Logic
Ethernet Switches
118
120
100
108
112
102
122
GMSC
MSC
VLR
Cluster
Storage
SS7 Network
HLR
IntelliGate
Signaling Relay Module
GMSC
SCP
In/Out
LAN
SCSI
116
110
106
104

Fig. 13

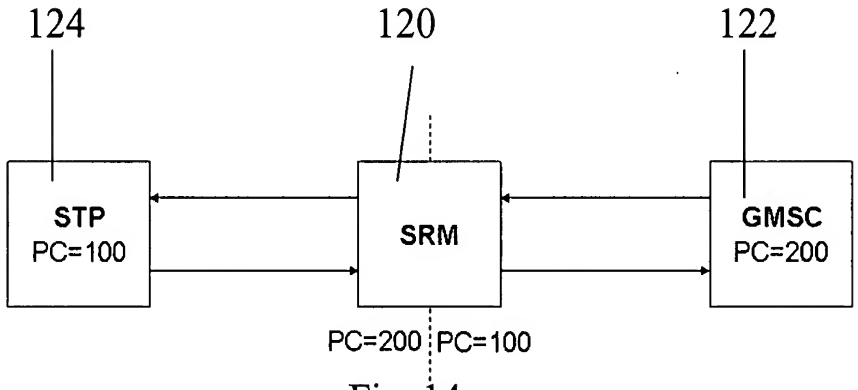

124
120
122
STP
PC=100
SRM
GMSC
PC=200
PC=200
PC=100

Fig. 14

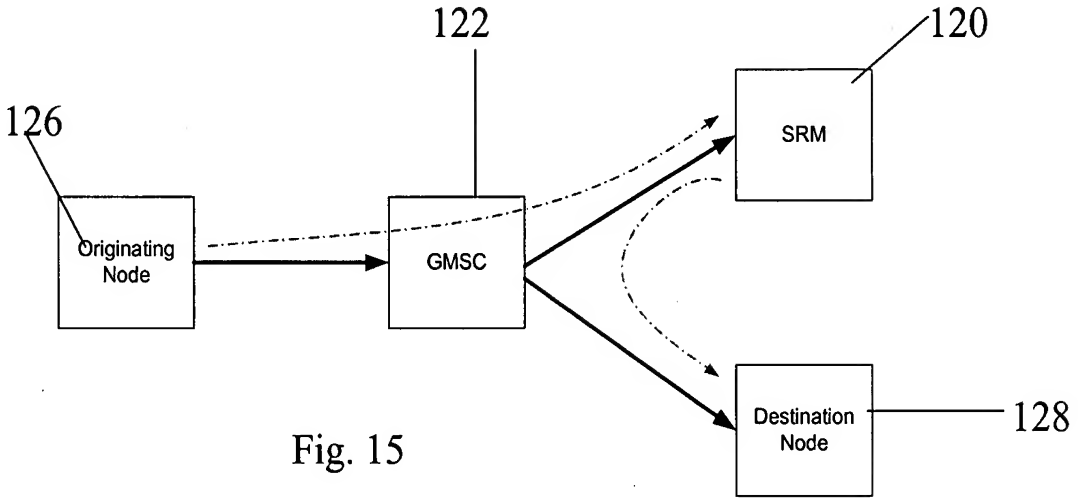

122
120
126
SRM
Originating
Node
GMSC
Destination
Node
128

Fig. 15

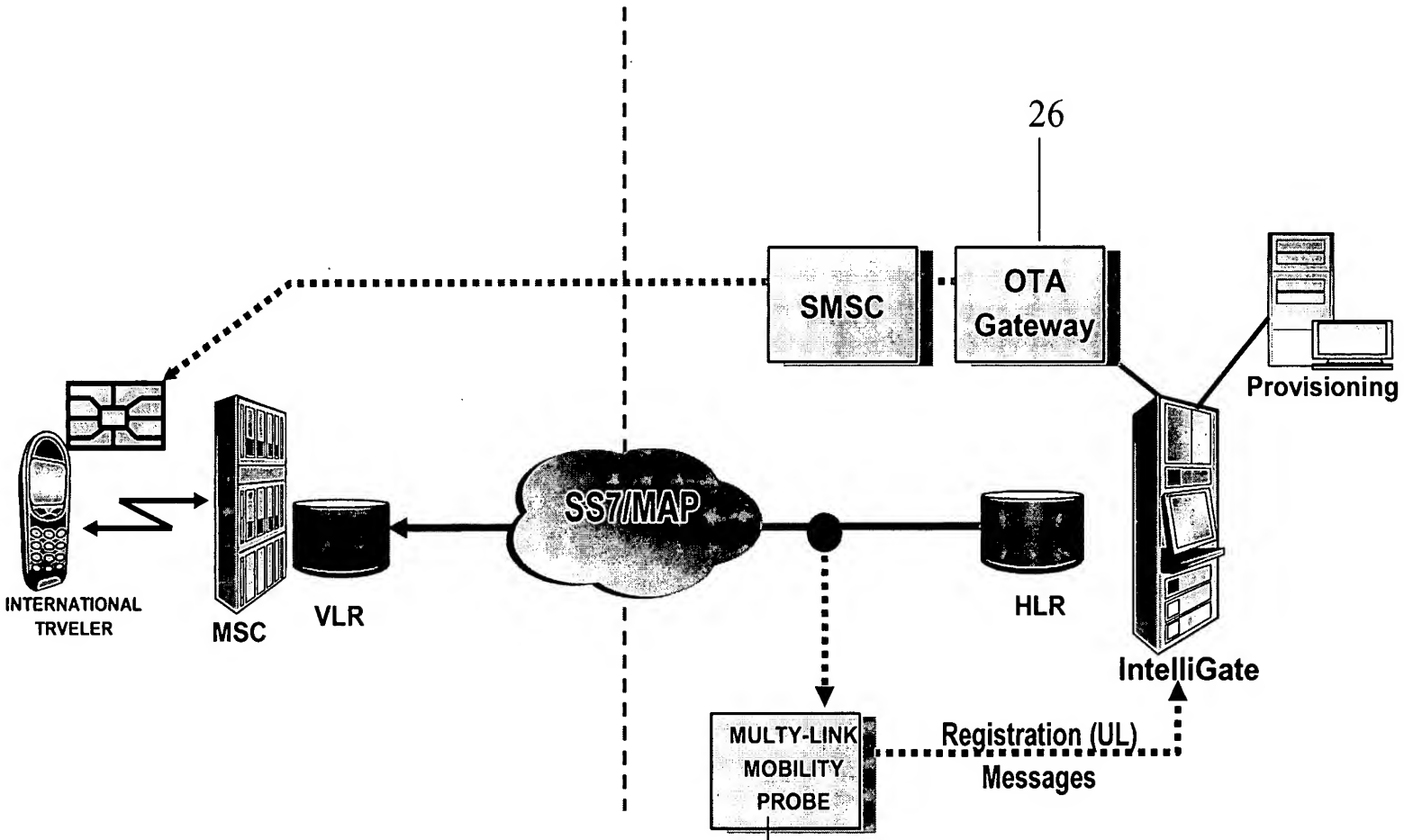

26
SMSC
OTA
Gateway
Provisioning
INTERNATIONAL
TRVELER
MSC
VLR
SS7/MAP
HLR
IntelliGate
MULTY-LINK
MOBILITY
PROBE
Registration (UL)
Messages
52

Fig. 16

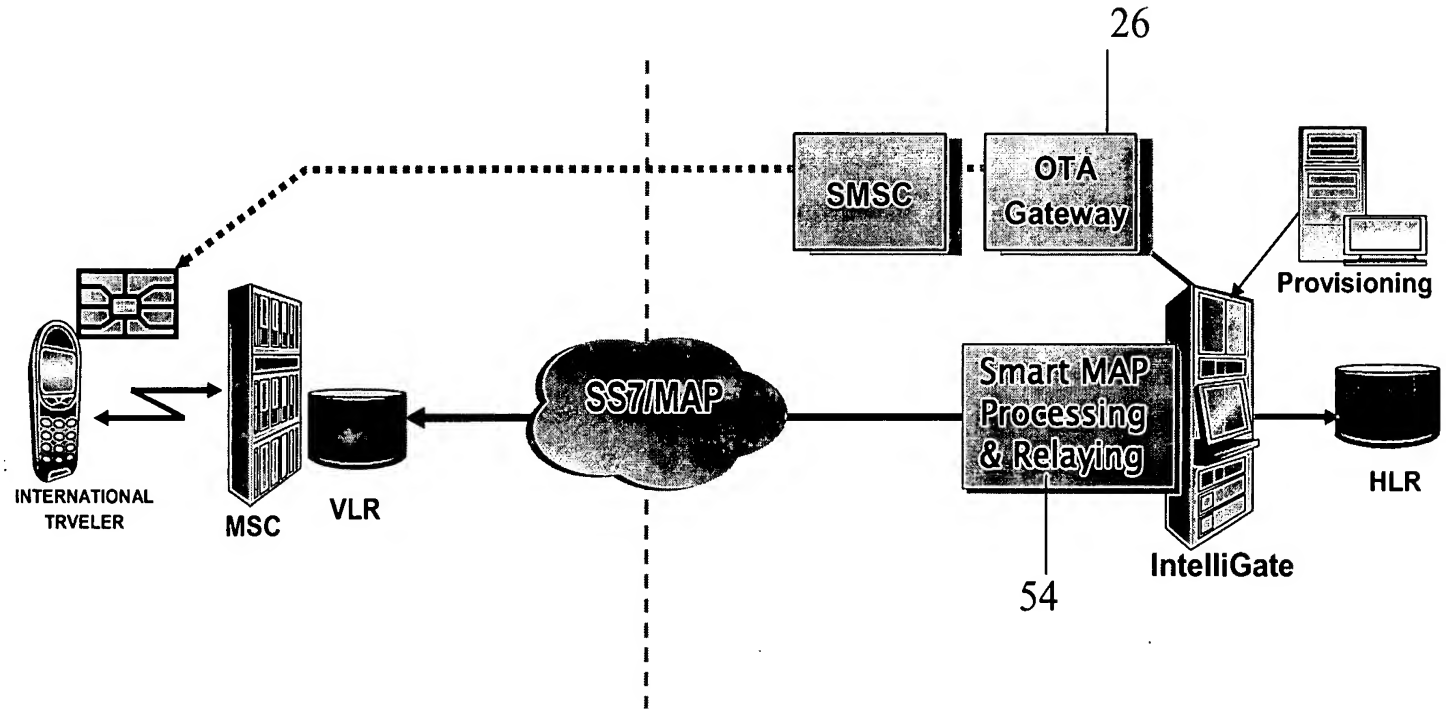

26
SMSC
OTA Gateway
Provisioning
INTERNATIONAL TRVELER
MSC
VLR
SS7/MAP
Smart MAP Processing & Relaying
HLR
IntelliGate
54

Fig. 17

# Preferred Network Relay+SIM

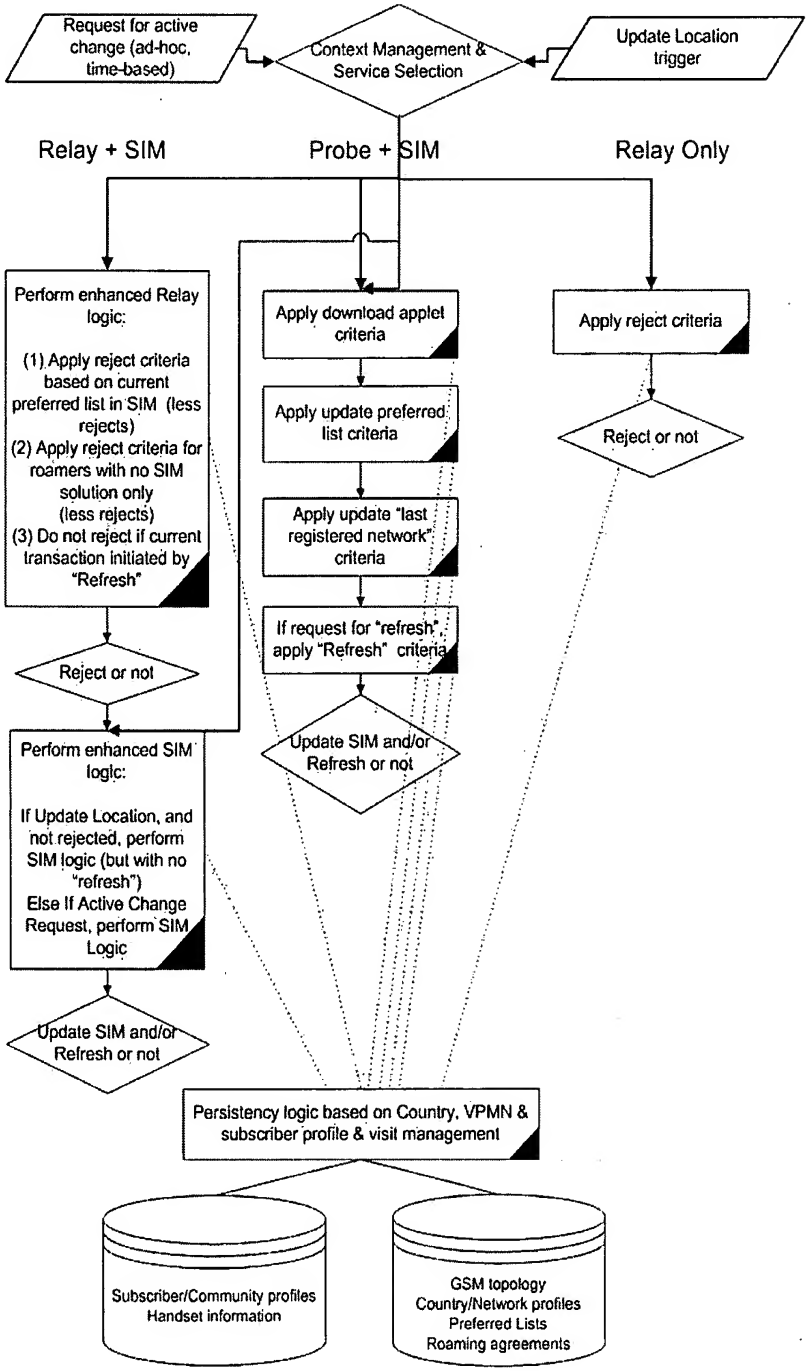



Fig. 18